marked decrease in the number of species present in older forest. In general the species lost are those which make use of the profuse understorey of the immature plantations—the honeyeaters, white-eyes and parrot-finch.

Most of the species present on the grasslands are also present in the young grassland pine plantations. However as the pine matures and the understorey becomes more sparse one sees again a reduction in the diversity of the avifauna. The reduction again involves the birds relying on the understory, and only the insectivorous species are left—the predatory White-collared Kingfisher *Halcyon chloris*, the Polynesian Triller *Lalage maculosa*, the Vanikoro Broadbill *Myiagra vanikorensis*, the Scarlet Robin *Petroica multicolor* and the Red-vented Bulbul *Pycnonotus cafer*.

In general, therefore the replacement of natural or semi-natural vegetation with pine leads to a progressive reduction in the diversity of the avifauna.

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Natal pterylosis of three *Thraupis* tanagers

by J. Ingels

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Data on natal down of tanagers (Thraupinae) are restricted to a few species only: *Piranga olivacea* (Wetherbee 1958) and *Thraupis palmarum* and *Euphonia violacea* (Collins 1963). This paper presents information on distribution and number of neossoptile sin 3 species of *Thraupis*: the Blue-grey Tanager *T. episcopus*, the Palm Tanager *T. palmarum* and the Sayaca Tanager *T. sayaca*.

Neossoptiles were counted on nestlings hatched under controlled conditions and taken from the nest within 24 hrs after hatching (stage A of Wetherbee 1957). Counts were made of damp neossoptiles under a microscope using a dissection pin as a pointer and preener. There were 5 *episcopus*, 2 *palmarum* and one *sayaca* specimens available. One breeding pair only was involved for each species. Nomenclature of pterylae follows Wetherbee (1957) but equivalent terminology of Collins (1963) for some tracts is indicated. Secondary coverts were not divided into greater, middle and lesser ones. The taxonomic arrangement is that of Peters (1970).

Neossoptiles of *sayaca*, *palmarum* and *episcopus* are blackish, dark grey and light grey respectively. An empirical impression of the total amount of natal down is: abundant in *episcopus*, moderate in *palmarum* and sparse in *sayaca*. This impression is caused by the difference in total neossoptile number, in length of neossoptiles (Table 1) and in number of barbs of each neossoptile.

All neossoptiles from these tanagers have a similar structure: a very short, reduced rachis ending in from 1 to 15 barbs with barbules. The number of

TABLE 1

Length (mm) of neossoptiles in the main pterylae of *T. episcopus* and *T. palmarum*.

Tract	*T. episcopus*	*T. palmarum*
Scapular	12–13	5–6
Spinal	10	5
Coronal	9–10	4–5
Retrices	2–5	1–2
Primaries	1	0

barbs varies considerably: primaries and rectrices have 1–2 (the shortest ones often appear bristle-like); femoral and ventral neossoptiles have 2–8; coronal, occipital, scapular, spinal and secondary covert neossoptiles have 6–15. The number of barbs in neossoptiles of a given tract increases from *sayaca*, *palmarum* to *episcopus*.

The number of neossoptiles in the different tracts and the total number of neossoptiles for 8 nestlings of the 3 *Thraupis* species are given in Table 2. Zero means that neossoptiles were sometimes absent. As in many other species, the number of neossoptiles in certain pterylae is very variable, the range increasing with the increase of nestlings examined; therefore data on the one *sayaca* nestling should be carefully interpreted.

TABLE 2

Natal down of 8 *Thraupis* nestlings.

Tract	*T. episcopus*					*T. sayaca*	*T. palmarum*	
Coronal	14/12	14/14	13/14	15/12	12/11	13/14	12/13	13/14
Occipital	4/4	4/5	4/4	5/5	4/4	4/4	5/5	4/4
Scapular (humeral)	9/8	10/8	9/9	9/10	9/9	9/9	9/10	8/9
Femoral	13/12	9/10	9/9	12/11	16/18	13/14	14/13	15/15
Abdominal (ventral)	0/0	0/0	0/0	0/0	10/10	(a)	10/10	10/11
Crural	0/4	0/0	1/4	0/0	1/0	1/2	1/1	1/2
Rectrices (caudal)	6/6	6/6	6/6	6/6	5/5	1/1	6/6	5/5
Primaries	5/5	6/9	9/8	10/9	0/0	0/0	0/0	0/0
Secondaries	0/0	0/0	0/0	4/2	0/0	0/0	0/0	0/0
Secondary coverts	15/17	16/17	17/17	20/21	16/16	18/18	18/14	14/15
Spinal	28	29	30	31	29	30	30	28
Total	162	163	169	188	175	151	177	173

(a) for the 'ventral' tract of *sayaca*, see text.

In the discussion which follows, Collins (1963) data on *palmarum* are used for comparison.

Coronal and occipital tracts.

In all 3 *Thraupis* species, 14 and 4 neossoptiles are typical for these 2 tracts respectively. In *sayaca* and *palmarum* the 2 tracts are clearly separated; however, in *episcopus* they tend to join and form one capital tract of 18 neossoptiles.

Scapular (humeral) tract.

Neossoptile numbers varied from 8 to 10 and were typically 9.

Femoral and abdominal (ventral) tracts.

Greatest variation in neossoptile numbers was found in the ventral tracts.

T. palmarum: 13–15, average 14, femoral neossoptiles and a uniserial row of on average 10 abdominal neossoptiles.

T. episcopus: The femoral tract had 9–18 neossoptiles, highly variable. Only one specimen, with abundant down, had abdominal neossoptiles (10 on each side).

T. sayaca: In *palmarum* and *episcopus* nestlings, femoral and abdominal tracts were in the typical positions (Wetherbee 1957). In the one *sayaca* nestling, the femoral tract was laterally displaced towards the caudal region: a uniserial row of neossoptiles ran from the upper ventral region into the normal femoral region. As this may be an individual variation only, data on other nestlings are needed.

Crural tract.

Crural neossoptiles around the lower tibiotarsus were present in some nestlings of all 3 *Thraupis* species, with abundant natal down.

Caudal tract.

In *episcopus* and *palmarum* nestlings, almost all 12 rectrices bear a neossoptile. The 2 outer caudal neossoptiles only were present in the one *sayaca* nestling.

Alar tract.

Primaries and primary coverts. In 4 of the 5 *episcopus* nestlings 5–10 primary neossoptiles, were found, in contrast to the other 2 species which showed none. Primary covert neossoptiles are completely absent in all *Thraupis* nestlings.

Secondaries and secondary coverts. A few secondary neossoptiles were found in only one *episcopus* nestling, one which had abundant natal down in other tracts. In all *Thraupis* nestlings examined (Table 2) the number of secondary covert neossoptiles was more constant than numbers in other tracts. For the 3 *Thraupis* species, an average of 18 neossoptiles is typical.

Spinal tract.

This tract averages 30 neossoptiles in all 3 *Thraupis* species. A double row of 14–18 dorsal neossoptiles joins a uniserial row of 8–12 upper pelvic neossoptiles, ending in a short double row of 2–6 paired neossoptiles in the lower pelvic region.

We have tried to determine a standard neossoptile distribution pattern for each of the 3 *Thraupis* tanagers by taking a typical neossoptile number in each tract (Table 3). From these figures, our neossoptile counts of *Thraupis* seem to confirm a correlation already mentioned by Collins (1963, 1973) and Harrison (1974) between a substantial reduction in number of neossoptiles and a cavity nesting habit. In open cup nesting species (*P. olivacea* and *Thraupis* species) 'covering' neossoptiles in pterylae of the upper parts (coronal, occipital, scapular, secondary covert and spinal tracts) are more abundant than in cavity nesting species. These neossoptiles camouflage a nestling in an open nest, making it less conspicuous, thus lowering risks of predation.

TABLE 3

Natal pterylosis of 5 Thraupinae tanagers: typical numbers of neossoptiles. Pterylae with neossoptiles in a few nestlings only and numerical averages of widely varying numbers of neossoptiles are indicated with an asterisk. All tracts are 'halved', except for the spinal tract.

Tract	*Euphonia violacea* (Collins 1963)	*Piranga olivacea* (Wetherbee 1958)	*Thraupis episcopus* (this study)	*Thraupis sayaca* (this study)	*Thraupis palmarum* Collins 1973) (this study)
Coronal	1	6	14	14	14
Occipital	4	4	4	4	4
Scapular (humeral)	5	8	9	9	9
Femoral	—	13	14	14	14
Abdominal (ventral)	—	12	10*	—	10
Crural	—	7	1	1	1*
Rectrices (caudal)	—	6	6	1	6
Primaries	—	10	8*	—	—
Primary coverts	—	8	—	—	—
Secondaries	—	2	1*	—	2*
Secondary coverts	—	17	18	18	18
Spinal	12	35	30	30	30
Number of nestlings examined	1	2	5	1	4

Neossoptile distribution patterns of only 5 species of Thraupinae have been described (Table 3). Only 4 pterylae (coronal, occipital, scapular and spinal) are always present; they are all found on the upper parts. The occipital tract only has a constant number of 4/4 neossoptiles. Neossoptile numbers for wing and leg pterylae are extremely variable throughout the 5 species. This variability is found also in the natal down pattern of Tersininae, e.g. *Tersina viridis* (Collins 1973) and of other Emberizinae, e.g. *Sicalis flaveola* and *Tiaris olivacea* (Harrison 1974), *Sporophila* finches (Collins & Kemp 1976) and *Paroaria gularis* (Collins & Bender 1977).

With regard to this extreme variability within the natal pterylosis, the neossoptile distribution pattern may prove to be a taxonomic character of limited utility. Only more extensive data on the natal pterylosis of neotropical passerines may reveal any real value in establishing taxonomic relationships.

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Morphometry, wing loading and food of western Darfur birds

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Darfur is known ornithologically only from the pioneering work of Admiral Lynes (Lynes 1924–1925) and some minor publications by Madden (1934, 1935, 1946). Later books with references to Darfur draw, apparently in entirety, from Lynes (Cave & MacDonald 1955, Mackworth-Praed & Grant 1960). The opportunity presented by an 18 months stay in western Darfur was taken advantage of and an effort has been made to monitor changes in the environment, the distribution and the seasonality of the avifauna which have taken place in the last 60 years. Full results have not yet been analysed. This preliminary note presents some physical data and information on food for a number of Darfur birds. Nomenclature generally follows that of White (1961–1965).

In Table 1, linear measurements are all in millimetres, wing area in square centimetres, weights in grams. Wing area was calculated from a drawn